



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE-EUROPE
CMR 402
APO AE 09180

AUG 31 2006

MCHB-AE-EE

MEMORANDUM FOR Directorate of Public Works, U.S. Army Garrison (USAG) Mannheim (IMEU-MAN-PW), Unit 29901, APO AE 09086


SUBJECT: Water Supply Management Program, Annual Drinking Water Surveillance, Project Number 31-5O-4861-06, USAG Mannheim, Germany, 12-13 July 2006.

A copy of the report is enclosed. We are very interested in your comments and suggestions for improving the usefulness of the information and recommendations provided in the report. If you have feedback, or if this report does not meet your needs or expectations, please contact me at DSN 486-8542 or CIV 06371-86-8542.

FOR THE COMMANDER:

2 Encls

1. Executive Summary
2. Report


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EXECUTIVE SUMMARY
WATER SUPPLY MANAGEMENT PROGRAM
ANNUAL DRINKING WATER SURVEILLANCE
PROJECT NUMBER 31-50-4861-06
USAG MANNHEIM
MANNHEIM, GERMANY
12-13 JULY 2006

1. **PURPOSE.** To assess the physical and chemical quality of drinking water supplied to the U.S. Army Garrison (USAG) Mannheim communities and to recommend courses of action to minimize potential adverse health effects if Environmental Final Governing Standards-Germany (GFGS) maximum contaminant levels (MCLs) are exceeded.

2. **CONCLUSIONS.**

a. Potability.

(1) Based on this study, water distributed to the Public Water Systems (PWS) at USAG Mannheim is potable.

(2) USAG Mannheim considers the Dannenfels Area Non-Public Water System (NPWS) as non-potable since the water is not treated. As a result, bottled water is supplied to personnel working at the Donnersberg Communication site. The Installation Management Agency-Europe (IMA-E) requested that the Directorate of Public Works examine the quality of this water system during their normal annual drinking water survey conducted by the U.S. Army Center for Health Promotion and Preventive Medicine-Europe (USACHPPMEUR).

b. Compliance.

(1) Continue routine annual monitoring of the drinking water supplied to the USAG Mannheim in accordance with the GFGS. Coordinate and plan for the required monitoring of asbestos in fiscal year 2007 per the GFGS.

(2) Friedrichsfeld Area PWS.

(a) The GFGS requires quarterly monitoring for nitrates and volatile organic compounds (VOCs).

(b) The drinking water supplied to Friedrichsfeld Area PWS is not compliant with the GFGS for disinfection.

(3) Mannheim Area PWS. The analytical results indicate that the drinking water supplied to the Mannheim Area PWS is compliant with the GFGS.

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(4) Grünstadt Area PWS.

(a) The GFGS requires additional analysis of Radium-226 and -228. Samples have been submitted to the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) for species determination. Results will be provided upon receipt as an addendum to this report.

(b) The drinking water supplied to the Grünstadt Area PWS is not compliant with the GFGS for disinfection.

(5) Dannenfels Area NPWS. This water system is considered a non-potable water system. The water is not disinfected. Turbidity was above the MCL of 1 Nephelometric Turbidity Units (NTU), color was above the MCL of 15 color units, and iron was above the MCL of 0.2 mg/L.

3. RECOMMENDATIONS.

a. Public Education and Notification.

(1) Notify consumers of the Friedrichsfeld Area PWS, and Grünstadt Area PWS and that the water supplied is not disinfected. Notify the consumers of the Dannenfels Area NPWS that the water supplied is considered non-potable.

(2) Inform the public of this study and its findings, conclusions, and recommendations. This can serve as a means to promote confidence in the public water supply as well as inform consumers about water quality concerns and any corrective actions taken.

b. Compliance.

(1) Continue routine annual monitoring of the drinking water supplied to the USAG Mannheim in accordance with the GFGS. Coordinate and plan for the required monitoring of asbestos in fiscal year 2007 per the GFGS.

(2) Friedrichsfeld Area PWS.

(a) Conduct quarterly monitoring for nitrates and VOCs. Request quarterly monitoring results from the water supplier or contact USACHPPMEUR for assistance with conducting quarterly monitoring.

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(b) Provide disinfection of the drinking water supplied to the Friedrichsfeld Area PWS in accordance with the GFGS. Disinfection must provide a detectable disinfectant residual throughout the distribution system. If disinfection is not feasible, request an exception to policy through IMA-E and European Regional Medical Command (ERMC).

(c) Consider installing an ion exchange unit or reverse osmosis system to reduce nitrate levels and consider installing a granular activated charcoal filter in combination with a packed tower aeration unit to reduce VOC levels.

(3) Grünstadt Area PWS. Provide disinfection of the drinking water supplied to the Grünstadt Area PWS in accordance with the GFGS. If disinfection is not feasible, request an exception to policy through IMA-E and ERMC.

(4) Dannenfels Area NPWS. Provide bottled water to the installation until adequate source water treatment including filtration and disinfection is installed.

**WATER SUPPLY MANAGEMENT PROGRAM
ANNUAL DRINKING WATER SURVEILLANCE
PROJECT NUMBER 31-50-4861-06
USAG MANNHEIM
MANNHEIM, GERMANY
12-13 JULY 2006**

1. **REFERENCES.** A list of references is provided in Appendix A.
2. **AUTHORITY.** U.S. Department of Defense (DOD), Environmental Final Governing Standards-Germany (GFGS), Chapters 1 and 3, January 2003 (reference 1).
3. **PURPOSE.** To assess the physical and chemical quality of drinking water supplied to the U.S. Army Garrison (USAG) Mannheim communities and to recommend courses of action to minimize potential adverse health effects if Environmental Final Governing Standards-Germany (GFGS) maximum contaminant levels (MCLs) are exceeded.
4. **GENERAL.**
 - a. **Personnel Contacted.** Personnel Contacted. Mr. Menz, Operations and Maintenance Division, Directorate of Public Works (DPW), USAG Mannheim.
 - b. **Personnel Conducting Study.**
 - (1) CPT Michael Schwarz, Environmental Engineer, Environmental Engineering Division (EED), Department of Environmental Sciences (DES), U.S. Army Center for Health Promotion and Preventive Medicine-Europe (USACHPPMEUR) was the project officer.
 - (2) 2LT Sean Beeman, Environmental Science Officer, EED, DES, USACHPPMEUR, was the assistant project officer and prepared the report.
 - (3) Mr. Shannon Gutierrez, Environmental Science Officer, EED, DES, USACHPPMEUR, assisted with the field sampling.
 - c. **Study Dates.** The field work for this study was conducted 12-13 July 2006.
 - d. **Water Systems.** USAG Mannheim operates three public water systems (PWS) and one non-public water system (NPWS). A PWS is defined by the GFGS as a system for providing piped water to the public for human consumption, if such system has at least 15 service connections or regularly serves at least 25 year round residents. A NPWS is defined by the GFGS as a system that does not meet the definition of a public water system; for example, a well serving a building with less than 25 people (reference 1). Each water system is briefly discussed below and in Appendix B.

Distribution limited to U.S. Government agencies only; protection of privileged information evaluating another command; August 2006. Requests for this document must be referred to USAG Mannheim (IMEU-MAN-PWO), Unit 29901, APO AE 09086.

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(a) Friedrichsfeld Area PWS. Potable water supplied to the Friedrichsfeld PWS is supplied by the Stadtwerke Mannheim-Wasserwerk Rheinau and serves the Friedrichsfeld installation. The water supplied to this area is not disinfected.

(b) Mannheim Area PWS. Potable water serving the Mannheim PWS is supplied by the Stadtwerke Mannheim-WW Käfertal. The Mannheim PWS serves seven installations in Mannheim. These installations include: Turley Barracks, Spinelli Barracks, Coleman, Sullivan Barracks, Funari Barracks, Benjamin Franklin Village, and Taylor Barracks. The U.S. Army disinfects water supplied to this system using a sodium hypochlorite solution. The water is then fluoridated prior to distribution in the system at Sullivan Barracks, Funari Barracks, Benjamin Franklin Village, and Taylor Barracks.

(c) Grünstadt Area PWS. Potable water serving the Grünstadt PWS is supplied by the Stadtwerke Grünstadt. The Grünstadt PWS serves the Grünstadt Army and Air Force Exchange Services (AAFES) Depot. The water supplied to this area is not disinfected.

(d) Dannenfels Area NPWS. This NPWS consists of one U.S. owned and operated well and supplies the Donnersberg Communication Site. USAG Mannheim considers this water non-potable. This decision was based upon the following: the water is not filtered, there is no additional treatment, there is low usage water, and the water can have an exceptionally long stagnation time in the distribution system. As a result, bottled water is supplied to personnel working at the Donnersberg Communication site.

(2) Historical Data.

(a) Nitrates. In fiscal year (FY) 2005, nitrate levels were above the increased monitoring threshold of 5 milligrams per liter (mg/L) at the Friedrichsfeld Area PWS (reference 2). Therefore, quarterly monitoring was required in accordance with the GFGS. The DPW has contracted the Wasserwerk Rheinau to conduct this sampling.

(b) Trichloroethene (TCE). In FY05, TCE levels were above the increased monitoring threshold of 0.0005 mg/L at the Friedrichsfeld Area PWS (reference 2). Therefore, quarterly monitoring was required in accordance with the GFGS. The DPW has contracted the Wasserwerk Rheinau to conduct this sampling.

5. PROCEDURES.

a. Applicable Drinking Water Standards. Results were evaluated in accordance with the following standards.

(1) The MCLs in the GFGS were used as the primary standards.

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(2) Turbidity and total trihalomethanes (TTHMs) were evaluated in accordance with the United States Environmental Protection Agency (USEPA) National Primary Drinking Water Regulations (NPDWR) (reference 3).

(3) Color, odor, and total dissolved solids were evaluated in accordance with the USEPA National Secondary Drinking Water Regulations (NSDWR) (reference 3).

b. Parameter Selection.

(1) Physical and chemical parameters were selected based on the GFGS. The GFGS specifies parameters and their respective frequency of sampling. However, where health concerns dictate that more stringent requirements are applied or other parameters be monitored, USACHPPMEUR conducts their monitoring accordingly. USACHPPMEUR does not conduct bacteriological monitoring. The Heidelberg Preventive Medicine Activity performs bacteriological monitoring for USAG Mannheim on a monthly basis.

(2) USACHPPMEUR monitors PWS for pesticides, polychlorinated biphenyls (PCBs), and radionuclides on a three year sampling cycle to support GFGS requirements. These parameters were analyzed during this sampling event and are scheduled to be monitored again in FY09.

(3) The GFGS specifies that asbestos in drinking water must be monitored once every nine years. Asbestos testing conducted in FY98 was in compliance with the GFGS. Asbestos will be monitored again in FY07.

c. Sample Locations. USACHPPMEUR sampled each PWS in accordance with the GFGS. In conjunction with the USAG Mannheim DPW, the USACHPPMEUR project officer selected at least one representative sample location from each PWS. Samples were collected at the beginning of all the distribution systems, subsequent to treatment, to represent the quality of the drinking water serving all installations within each respective water system. The list below itemizes each PWS and the respective sampling locations.

(1) Friedrichsfeld Area PWS - Building 1040. (Purchased Water)

(2) Mannheim Area PWS - Building 700. (Purchased Water)

(3) Grünstadt Area PWS - Building 3550. (Purchased Water)

(4) Dannenfels Area NPWS - Building 2451. (U.S. Owned Well)

d. TTHMs. The Mannheim Area PWS provides chlorine disinfection. Locations were selected that represents the maximum residence time of treated water in that system. A sample was collected from these locations for TTHM analysis.

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- (1) Building 475, Turley Barracks.
- (2) Building 1563, Spinelli Barracks.
- (3) Building 1492, Coleman Barracks.
- (4) Building 2000, Benjamin Franklin Village.
- (5) Building 429, Taylor Barracks.

e. Fluoride. The Mannheim Area PWS provides drinking water fluoridation. A sample was collected from these locations for fluoride concentration analysis.

- (1) Building 2000, Benjamin Franklin Village.
- (2) Building 429, Taylor Barracks.

f. Increased Monitoring. USAG Mannheim received water supply records on a quarterly basis from Wasserwerk Rheinau. Results for nitrate and TCE are provided in Appendix C, tables C-10 and C-11.

g. Sample Collection. USACHPPMEUR personnel collected the drinking water samples from a cold-water faucet or sampling tap at each location using procedures outlined in the U.S. Army Environmental Hygiene Agency Technical Guide 155 (reference 4). To purge any stagnant water in the distribution system, the water was allowed to flow moderately for three to five minutes until the temperature stabilized. Due to the exceptionally long stagnation time in the system, water at the Dannenfels Area PWS was allowed to flow for 30 minutes prior to sample collection. Temperature and pH was measured on-site (Appendix C, table C-9). The samples were preserved at the time of collection and kept cool at all times during transport from the collection site to the laboratory.

h. Laboratory Analyses and Quality Control. The analytical results are located in Appendix C, tables C-1 through C-8. Laboratory certification, analytical method details, and laboratory quality assurance information are provided in Appendix D.

6. FINDINGS AND DISCUSSION. Significant findings are summarized and discussed below by PWS.

a. Friedrichsfeld Area PWS.

(1) The nitrate concentration was 5.7 mg/L, which is above the increased monitoring threshold of 5.0 mg/L, but below the MCL of 10.0 mg/L (Appendix C, table C-1). Quarterly

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monitoring results from Wasserwerk Rheinau indicate that nitrate concentration ranged from 5.33 mg/L to 5.81 mg/L during the past year (Appendix C, table C-10).

(2) Volatile Organic Compounds (VOC).

(a) Tetrachloroethene (PCE) was 0.0014 mg/L, which is above the increased monitoring threshold of 0.0005 mg/L, but is below the MCL of 0.005 mg/L (Appendix C, table C-3).

(b) TCE was below the method detection limit. Quarterly monitoring results from Wasserwerk Rheinau indicate that TCE concentration ranged from 0.0002 mg/L to 0.0003 mg/L during the past year, which is below the increased monitoring threshold of 0.0005 mg/L.

(3) The remaining analytical results were below the MCLs established in the GFGS.

(4) The drinking water supplied to the Friedrichsfeld Area PWS is not disinfected; therefore, it does not meet the U.S. Army and GFGS requirements for disinfection of drinking water (references 1 and 5). The GFGS requires a disinfectant residual be maintained throughout the drinking water distribution system.

b. Mannheim Area PWS. The analytical results were below the MCLs established in the GFGS.

c. Grünstadt Area PWS.

(1) Gross alpha activity was 8.9 picocuries per liter (pCi/L) with an uncertainty of +/- 2.8 pCi/L (Appendix C, table C-5). The gross alpha activity is below the MCL of 15 pCi/L; however, the GFGS requires additional analysis of Radium-226 and -228 when gross alpha activity is above 5.0 pCi/L including upper limits of uncertainty. Additional samples were collected and submitted to the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) for species determination. Results will follow this report in an addendum.

(2) The remaining analytical results were below the MCLs established in the GFGS.

(3) The drinking water supplied to the Grünstadt Area PWS is not disinfected; therefore, it does not meet the U.S. Army and GFGS requirements for disinfection of drinking water (references 1 and 5). The GFGS requires a disinfectant residual be maintained throughout the drinking water distribution system.

d. Dannenfels Area NPWS. This NPWS is not used as a drinking water source. The water supplied to the Dannenfels Area NPWS is not disinfected. It provides water to a toilet and a sink for personal hygiene only.

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(1) Turbidity was 18.0 Nephelometric Turbidity Units (NTU) (Appendix C, table C-1), which is above the MCL of 1 NTU established by the USEPA. Iron was 6.7 mg/L (Appendix C, table C-2), which is above the MCL of 0.2 mg/L. Color was 70 color units (Appendix C, table C-1); which is above the MCL of 15 color units. The high turbidity and color values are likely a result of the iron concentration and long stagnation time due to low usage.

(2) The remaining analytical results were below the MCLs established in the GFGS.

7. CONCLUSIONS.

a. Potability.

(1) Based on this study, water distributed to the PWSs at USAG Mannheim is potable.

(2) USAG Mannheim considers the Dannenfels Area Non-Public Water System (NPWS) as non-potable since the water is not treated. As a result, bottled water is supplied to personnel working at the Donnersberg Communication site. Installation Management Agency-Europe (IMA-E) requested that the DPW examine the quality of this water system during their normal annual drinking water survey conducted by USACHPPMEUR.

b. Compliance.

(1) Continue routine annual monitoring of the drinking water supplied to the USAG Mannheim in accordance with the GFGS. Coordinate and plan for the required monitoring of asbestos in FY07 per the GFGS.

(2) Friedrichsfeld Area PWS.

(a) The GFGS requires quarterly monitoring for nitrates and VOCs.

(b) The drinking water supplied to Friedrichsfeld Area PWS is not compliant with the GFGS for disinfection.

(3) Mannheim Area PWS. The analytical results indicate that the drinking water supplied to the Mannheim Area PWS is compliant with the GFGS.

(4) Grünstadt Area PWS.

(a) The GFGS requires additional analysis of Radium-226 and -228. Additional samples were collected and submitted to USACHPPM for species determination. Results will be provided upon receipt as an addendum to this report.

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(b) The drinking water supplied to the Grünstadt Area PWS is not compliant with the GFGS for disinfection.

(5) Dannenfels Area NPWS. This water system is considered a non-potable water system. The water is not disinfected. Turbidity was above the MCL of 1 Nephelometric Turbidity Units (NTU), color was above the MCL of 15 color units, and iron was above the MCL of 0.2 mg/L.

8. RECOMMENDATIONS.

a. Public Education and Notification.

(1) Notify consumers of the Friedrichsfeld Area PWS, and Grünstadt Area PWS and that the water supplied is not disinfected. Notify the consumers of the Dannenfels Area NPWS that the water supplied is considered non-potable.

(2) Inform the public of this study and its findings, conclusions, and recommendations. This can serve as a means to promote confidence in the public water supply as well as inform consumers about water quality concerns and any corrective actions taken.

b. Compliance.

(1) Continue routine annual monitoring of the drinking water supplied to the USAG Mannheim in accordance with the GFGS. Coordinate and plan for the required monitoring of asbestos in FY07 per the GFGS.

(2) Friedrichsfeld Area PWS.

(a) Conduct quarterly monitoring for nitrates and VOCs. Request quarterly monitoring results from the water supplier or contact USACHPPMEUR for assistance with conducting quarterly monitoring.

(b) Provide disinfection of the drinking water supplied to the Friedrichsfeld Area PWS in accordance with the GFGS. Disinfection must provide a detectable disinfectant residual throughout the distribution system. If disinfection is not feasible, request an exception to policy through IMA-E and European Regional Medical Command (ERMC).

(c) Consider installing an ion exchange unit or reverse osmosis system to reduce nitrate levels and consider installing a granular activated charcoal filter in combination with a packed tower aeration unit to reduce VOC levels.

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(3) Grünstadt Area PWS. Provide disinfection of the drinking water supplied to the Grünstadt Area PWS in accordance with the GFGS. If disinfection is not feasible, request an exception to policy through IMA-E and ERMC.

(4) Dannenfels Area NPWS. Provide bottled water to the installation until adequate source water treatment including filtration and disinfection is installed.

9. **TECHNICAL ASSISTANCE.** The point of contact for additional assistance is the undersigned at DSN 486-7048, CIV 06371-86-7048, FAX (DSN) 486-8954, CIV FAX 06371-86-8954, or via e-mail at sean.beeman@us.army.mil. Requests for additional services should be directed to Mr. Bob Ackley at robert.ackley@amedd.army.mil or DSN 486-8562.



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APPROVED:



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APPENDIX A

REFERENCES

1. U.S. Department of Defense, Environmental Final Governing Standards – Germany, prepared by: Environmental Office, Office of the Deputy Chief of Staff, Engineer, Headquarters, U.S. Army - Europe, Heidelberg, Germany, January 2003.
2. Memorandum, MCHB-AE-EE, USACHPPM-EUR, Water Supply Management Program, Annual Drinking Water Surveillance, Project No. 31-63-1002-05, 293rd Base Support Battalion (BSB) Mannheim, Germany, 14-18 March 2005.
3. Code of Federal Regulations, Title 40, Part 141, National Primary Drinking Water Regulations, and Part 143, National Secondary Drinking Water Regulations, 1999.
4. United States Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD 21010, Environmental Sampling Guide, USAEHA TG 155, February 1993.
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6. United States Environmental Protection Agency, Office of Research and Development Washington DC 20460, Methods for the Determination of Metals in Environmental Samples, EPA/600/4-91/010, June 1991.
7. United States Environmental Protection Agency, Office of Research and Development Washington DC 20460, Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.
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10. Deutsche Einheitsverfahren zur Wasser-, Abwasser-, und Schlammuntersuchung, EN ISO 25663, Bestimmung des Kjeldahl-Stickstoffs (H11), November 1993.

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12. Deutsche Einheitsverfahren zur Wasser-, Abwasser-, und Schlammuntersuchung, DIN 38407, Gemeinsam erfaßbare Stoffgruppen (Gruppe F), Bestimmung von Benzol und einigen Derivaten mittels Gaschromatographie (F9), Mai 1991.

13. American Public Health Association, American Water Works Association, and Water Environment Federation, Standard Methods for the Examination of Water and Wastewater; 19th Edition, 1995.

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APPENDIX B

WATER SYSTEMS

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Table B-1. USAG Mannheim Water Systems

Public Water System	Water System Type	Water Source	Areas Supplied	Water Treatment by U.S.	Type of Monitoring and Sampling Points	
					Annual	Total Trihalomethanes
Friedrichsfeld Area	PWS-NTNC	Wasserwerk Rheinau	Friedrichsfeld	No Additional Treatment	Bldg 1040	Not Sampled
Mannheim Area	PWS-CWS	Wasserwerk Käferal/WW Rheinau (RHE Wasserwerke Rhein-Neckar AG)	Turley Barracks	Chlorination Bldg 517	Bldg 700 (Benjamin Franklin Village)	Bldg 475
	PWS-CWS		Spinelli Barracks	Chlorination Bldg 1541		Bldg 1563
	PWS-CWS		Coleman Barracks & Class III	Chlorination Bldg 1272 and Bldg 83		Bldg 1492
	PWS-CWS		Sullivan Barracks	Chlorination and Fluoridation Bldg 700 and Bldg 273		Bldg 2000 (Benjamin Franklin Village) and Bldg 429 (Taylor Barracks)
	PWS-CWS		Funari Barracks			
	PWS-CWS		Benjamin Franklin Village			
	PWS-CWS		Taylor Barracks			
Grünstadt Area	PWS-CWS	Stadtwerke Grünstadt	Grünstadt AAFES Depot	No Additional Treatment	Bldg 3550	Not Sampled
Damenfels Area	NPWS	U. S. Owned Weil	Domersberg Communication Station	No Additional Treatment	Bldg 2451	Not Sampled

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APPENDIX C

ANALYTICAL RESULTS

^aStandards: Maximum contaminant level (MCL) – German Final Governing Standards

^bNo Std – No Standard exists under GFGS

^cMDL – Method detection limit

^dBDL – Below method detection limit

^eMeasured as N; MCL established as NH_4 , results were converted to ammonia as NH_4

^fMeasured as free cyanide

^gMeasured as P, GFGS established an MCL of 6.7 mg/L as PO_4^{-3} . Results were converted to phosphorus as PO_4^{-3}

^hUSEPA National Secondary Drinking Water Regulation

ⁱ1 NTU used as screening criteria for turbidity of purchased water supply

^jUSEPA National Primary Drinking Water Regulation

BOLD values indicate increased monitoring is required

BOLD on shaded indicates values exceeded MCL

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Table C-1: Inorganic / Physical Parameter Results

WATER SUPPLIER PWS	SAMPLE LOCATION SAMPLE SITE	COLLECTION DATE	PARAMETERS	UNITS	MCL ^a	MDL ^c	Wasserverk Rheinau Friedrichsfeld Friedrichsfeld Bldg 1040 12-Jul-06	Wasserverk Kaefertal Mannheim Benjamin Franklin Village Bldg 700 12-Jul-06	Stadtwerke Gruenstadt Gruenstadt AAFES Depot Bldg 3550 13-Jul-06	U.S. Owned Well Dannenfels Donnersberg Bldg 2451 13-Jul-06
RESULTS										
Inorganic / Physical										
Ammonia (as N) ^e				mg/L	0.5	0.05	BDL ^d	BDL	BDL	BDL
Chloride				mg/L	250	5	51	25	23	15
Color (Pt/Co Method)				color units	15 ^h	5	BDL	BDL	BDL	70
Conductivity				$\mu\text{S cm}^{-1}$	2000	1	790	770	540	150
Cyanide ^f				mg/L	0.05	0.01	BDL	BDL	BDL	BDL
Fluoride				mg/L	4	0.1	0.12	0.91	0.11	0.12
Hardness (as CaCO ₃)				mg/L	No Std ^b	0.02	370	390	240	33
Nitrate (as N)				mg/L	10	0.2	5.7	0.28	3.5	1.9
Nitrite (as N)				mg/L	1	0.03	BDL	BDL	BDL	BDL
Total Nitrate-Nitrite (as N)				mg/L	10	0.2	5.7	0.28	3.5	1.9
Odor				TON	3	Not Detected	NOD	NOD	NOD	2
Oxidizability (as O ₂)				mg/L	5	0.5	BDL	BDL	BDL	0.6
pH at laboratory				unitless	6.5 - 9.5	0.01	7.4	7.5	7.9	7.6
Total Phosphorous (as PO ₄ ⁻³) ^g				mg/L	6.7	0.05	BDL	BDL	0.29	BDL
Sulfate (as SO ₄ ⁻²)				mg/L	240	5	83	76	42	27
Total Dissolved Solids (TDS)				mg/L	500 ^{b,h}	5	460	500	290	330
Turbidity				NTU	1 ^{i,j}	0.2	0.6	0.65	0.6	18

SUBJECT: Water Supply Management Program, Annual Drinking Water Surveillance, Project Number 31-5O-4861-06, USAG Mannheim, Germany, 12-13 July 2006

WATER SUPPLIER					Wasserwerk Rheinau Friedrichsfeld Friedrichsfeld Bldg 1040 12-Jul-06	Wasserwerk Kaefertal Mannheim Benjamin Franklin Village Bldg 700 12-Jul-06	Stadtwerke Gruenstadt Gruenstadt Gruenstadt AAFES Depot Bldg 3550 13-Jul-06	U.S. Owned Well Dannenfels Donnersberg Bldg 2451 13-Jul-06
PWS								
SAMPLE LOCATION								
SAMPLE SITE								
COLLECTION DATE								
PARAMETERS	UNITS	MCL ^a	MDL ^c	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
Metals								
Antimony (Sb)	mg/L	0.006	0.001	BDL ^d	BDL	BDL	BDL	BDL
Arsenic (As)	mg/L	0.01	0.001	BDL	BDL	BDL	0.0015	BDL
Barium (Ba)	mg/L	1.0	0.005	0.064	0.3	0.13	0.13	0.015
Beryllium (Be)	mg/L	0.004	0.0002	BDL	BDL	BDL	BDL	0.00048
Boron (B)	mg/L	1.0	0.05	BDL	BDL	BDL	BDL	BDL
Cadmium (Cd)	mg/L	0.005	0.0002	BDL	BDL	BDL	BDL	BDL
Calcium (Ca)	mg/L	400	0.5	110	130	67	9.7	9.7
Chromium (Cr)	mg/L	0.05	0.004	BDL	BDL	BDL	BDL	BDL
Copper (Cu)	mg/L	1.3	0.005	0.0058	BDL	BDL	BDL	BDL
Iron (Fe)	mg/L	0.2	0.1	BDL	BDL	BDL	BDL	BDL
Lead (Pb)	mg/L	0.04	0.001	0.0015	BDL	BDL	BDL	BDL
Magnesium (Mg)	mg/L	50	0.1	24	17	19	2.1	2.1
Manganese (Mn)	mg/L	0.05	0.002	0.0027	BDL	BDL	BDL	0.026
Mercury (Hg)	mg/L	0.001	0.0002	BDL	BDL	BDL	BDL	BDL
Nickel (Ni)	mg/L	0.05	0.002	0.0026	0.0029	BDL	BDL	BDL
Potassium (K)	mg/L	12	0.5	2.3	2.5	7.3	0.8	0.8
Selenium (Se)	mg/L	0.01	0.001	BDL	0.0015	0.0015	BDL	BDL
Silver (Ag)	mg/L	0.01	0.005	BDL	BDL	BDL	BDL	BDL
Sodium (Na)	mg/L	150	1	19	15	13	13	13
Thallium (Tl)	mg/L	0.002	0.0002	BDL	BDL	BDL	BDL	BDL
Zinc (Zn)	mg/L	5.0	0.005	0.15	0.017	0.17	0.17	0.11

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SUBJECT: Water Supply Management Program, Annual Drinking Water Surveillance, Project Number 31-5O-4861-06, USAG Mannheim, Germany, 12-13 July 2006

Table C-3: Volatile Organic Compound Results

WATER SUPPLIER PWS	SAMPLE LOCATION SAMPLE SITE	COLLECTION DATE	PARAMETERS	UNITS	MCL ^a	MDL ^c	Wasserwerk Rheinau Friedrichsfeld Bldg 1040 12-Jul-06	Wasserwerk Kaefertal Mannheim Benjamin Franklin Village Bldg 700 12-Jul-06	Stadtwerke Gruenstadt Gruenstadt Gruenstadt AAFES Depot Bldg 3550 13-Jul-06	U.S. Owned Well Dannenfels Donnersberg Bldg 2451 13-Jul-06
Volatile Organic Compounds										
1,2,4 Trichlorobenzene				mg/L	0.07	0.0005	BDL ^d	BDL	BDL	BDL
1,1,2-Trichloroethane				mg/L	0.005	0.0005	BDL	BDL	BDL	BDL
1,1-Dichloroethene				mg/L	0.007	0.0005	BDL	BDL	BDL	BDL
1,2 Dichloroethane				mg/L	0.005	0.0005	BDL	BDL	BDL	BDL
1,2 Dichloropropane				mg/L	0.005	0.0005	BDL	BDL	BDL	BDL
1,2-Dichlorobenzene				mg/L	0.6	0.0005	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene				mg/L	0.075	0.0005	BDL	BDL	BDL	BDL
Benzene				mg/L	0.005	0.0005	BDL	BDL	BDL	BDL
Carbon tetrachloride				mg/L	0.003	0.0005	BDL	BDL	BDL	BDL
Chlorobenzene				mg/L	0.1	0.0005	BDL	BDL	BDL	BDL
Ethylbenzene				mg/L	0.7	0.0005	BDL	BDL	BDL	BDL
Styrene				mg/L	0.1	0.0005	BDL	BDL	BDL	BDL
Toluene				mg/L	1	0.0005	BDL	BDL	BDL	BDL
cis-1,2-Dichloroethene				mg/L	0.07	0.0005	BDL	BDL	BDL	BDL
trans-1,2-Dichloroethene				mg/L	0.1	0.0005	BDL	BDL	BDL	BDL
Vinyl Chloride				mg/L	0.002	0.0005	BDL	BDL	BDL	BDL
Xylenes, total				mg/L	10	0.0005	BDL	BDL	BDL	BDL
1,2 Dibromo-3-chloropropane (DBCP)				mg/L	0.0002	0.00001	BDL	BDL	BDL	BDL
1,2-Dibromoethane (EDB)				mg/L	0.00005	0.00001	BDL	BDL	BDL	BDL
2-Methoxy-2-methylpropane (MTBE)				mg/L	No Sid ^b	0.0005	BDL	BDL	BDL	BDL
Organic Chlorinated Compounds, total				mg/L	0.01	0.0005	0.0014	BDL	BDL	BDL
1,1,1 Trichloroethane				mg/L	0.2	0.0005	BDL	BDL	BDL	BDL
Methylene Chloride				mg/L	0.005	0.0005	BDL	BDL	BDL	BDL
Tetrachloroethylene (PCE)				mg/L	0.005	0.0005	0.0014	BDL	BDL	BDL
Trichloroethylene (TCE)				mg/L	0.005	0.0005	BDL	BDL	BDL	BDL
Trihalomethanes, total				mg/L	0.08 ^g	0.0005	BDL	0.0052	BDL	BDL
Dichlorobromomethane				mg/L	No Sid	0.0005	BDL	0.0021	BDL	BDL
Dibromochloromethane				mg/L	No Sid	0.0005	BDL	0.0011	BDL	BDL
Bromoform				mg/L	No Sid	0.0005	BDL	BDL	BDL	BDL
Chloroform				mg/L	No Sid	0.0005	BDL	0.002	BDL	BDL

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SUBJECT: Water Supply Management Program, Annual Drinking Water Surveillance, Project Number 31-50-4861-06, USAG Mannheim, Germany, 12-13 July 2006

Table C-4: Polycyclic Aromatic Hydrocarbon Results

WATER SUPPLIER PWS	SAMPLE LOCATION SAMPLE SITE COLLECTION DATE				Wasserwerk Rheinau Friedrichsfeld Bldg 1040 12-Jul-06	Wasserwerk Kaefertal Mannheim Benjamin Franklin Village Bldg 700 12-Jul-06	Stadwerke Gruenstadt Gruenstadt Gruenstadt AAFES Depot Bldg 3550 13-Jul-06	U.S. Owned Weil Dannenfels Donnersberg Bldg 2451 13-Jul-06
PARAMETERS	UNITS	MCL ^a	MDL ^c	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
Polycyclic Aromatic Hydrocarbons (regulated)								
Benzo-(b)-fluoranthene	mg/L	No Sid ^b	0.00002	BDL ^d		BDL	BDL	BDL
Benzo-(k)-fluoranthene	mg/L	No Sid	0.00002	BDL		BDL	BDL	BDL
Benzo-(a)-pyrene	mg/L	0.0002	0.000003	BDL		BDL	BDL	BDL
Benzo-(g,h,i)-perilene	mg/L	No Sid	0.00002	BDL		BDL	BDL	BDL
Fluoranthene	mg/L	No Sid	0.00002	BDL		BDL	BDL	BDL
Indeno-(1,2,3-c,d)-pyrene	mg/L	No Sid	0.00002	BDL		BDL	BDL	BDL
TOTAL	mg/L	0.0002	0.00002	BDL		BDL	BDL	BDL
Polycyclic Aromatic Hydrocarbons (non-regulated)								
Acenaphthene	mg/L	No Sid	0.00004	BDL		BDL	BDL	BDL
Acenaphthylene	mg/L	No Sid	0.00004	BDL		BDL	BDL	BDL
Anthracene	mg/L	No Sid	0.00002	BDL		BDL	BDL	BDL
Benzo-(a)-anthracene	mg/L	No Sid	0.00002	BDL		BDL	BDL	BDL
Chrysene	mg/L	No Sid	0.00002	BDL		BDL	BDL	BDL
Dibenzo(a,h)anthracene	mg/L	No Sid	0.00002	BDL		BDL	BDL	BDL
Fluorene	mg/L	No Sid	0.00002	BDL		BDL	BDL	BDL
Napthalene	mg/L	No Sid	0.00004	BDL		BDL	BDL	BDL
Phenanthrene	mg/L	No Sid	0.00002	BDL		BDL	BDL	BDL
Pyrene	mg/L	No Sid	0.00002	BDL		BDL	BDL	BDL

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SUBJECT: Water Supply Management Program, Annual Drinking Water Surveillance, Project Number 31-5O-4861-06, USAG Mannheim, Germany, 12-13 July 2006

Table C-5: Radionuclide and Polychlorinated Biphenyl Results

WATER SUPPLIER PWS	SAMPLE LOCATION	SAMPLE SITE	COLLECTION DATE	PARAMETERS	UNITS	MCL ^a	MDL ^c	Wasserverk Rheinau Friedrichsfeld Friedrichsfeld Bldg 1040 12-Jul-06	Wasserverk Kaefertal Mannheim Benjamin Franklin Village Bldg 700 12-Jul-06	Stadwerke Gruenstadt Gruenstadt Gruenstadt AAFES Depot Bldg 3550 13-Jul-06	U.S. Owned Well Dammenfels Donnersberg Bldg 2451 13-Jul-06
RESULTS											
Radionuclides											
Gross Alpha Activity					pCi/L	15	No Std	0.44	1.4	8.9	1.9
Gross Alpha Uncertainty					pCi/L	No Std ^b	No Std	1.2	1.5	2.8	1.2
Gross Alpha Min Detection Activity					pCi/L	No Std	No Std	1.5	1.5	1.5	0.98
Gross Beta Activity					pCi/L	50	No Std	2.0	-0.06	5.8	1.2
Gross Beta Uncertainty					pCi/L	No Std	No Std	1.4	1.2	1.4	0.89
Gross Beta Min Detection Activity					pCi/L	No Std	No Std	1.3	1.3	0.97	0.92
Polychlorinated Biphenyls (PCBs)											
Total					mg/L	0.0005	0.0001	BDL ^e	BDL	BDL	BDL

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SUBJECT: Water Supply Management Program, Annual Drinking Water Surveillance, Project Number 31-50-4861-06, USAG Mannheim, Germany, 12-13 July 2006

Table C-6: Pesticide Results

WATER SUPPLIER		UNITS	MCL ^a	MDL ^c		Wasserwerk Rheinau Friedrichsfeld Friedrichsfeld Bldg 1040 12-Jul-06	Wasserwerk Kaefertal Mannheim Benjamin Franklin Village Bldg 700 12-Jul-06	Stadwerke Gruenstadt Gruenstadt Gruenstadt AAFES Depot Bldg 3550 13-Jul-06	U.S. Owned Well Dannenfels Donnersberg Bldg 2451 13-Jul-06
PWS	SAMPLE LOCATION	SAMPLE SITE	COLLECTION DATE	PARAMETERS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
Organochlorine Pesticides									
	Alachlor	mg/L	No Std ^b	0.00002	BDL ^d	BDL	BDL	BDL	BDL
	Aldrin	mg/L	No Std	0.00002	BDL	BDL	BDL	BDL	BDL
	Atrazine	mg/L	No Std	0.0001	BDL	BDL	BDL	BDL	BDL
	Chlordane	mg/L	No Std	0.0001	BDL	BDL	BDL	BDL	BDL
	Dieldrin	mg/L	No Std	0.00002	BDL	BDL	BDL	BDL	BDL
	Endrin	mg/L	No Std	0.00002	BDL	BDL	BDL	BDL	BDL
	Heptachlor	mg/L	No Std	0.00002	BDL	BDL	BDL	BDL	BDL
	Heptachlor epoxide	mg/L	No Std	0.00002	BDL	BDL	BDL	BDL	BDL
	Hexachlorobenzene	mg/L	No Std	0.00002	BDL	BDL	BDL	BDL	BDL
	Hexachlorocyclopentadiene	mg/L	No Std	0.0001	BDL	BDL	BDL	BDL	BDL
	Lindane (gamma-HCH)	mg/L	No Std	0.00002	BDL	BDL	BDL	BDL	BDL
	4,4-Methoxychlor	mg/L	No Std	0.00002	BDL	BDL	BDL	BDL	BDL
	Simazine	mg/L	No Std	0.0001	BDL	BDL	BDL	BDL	BDL
	Toxaphene	mg/L	0.0001	0.0001	BDL	BDL	BDL	BDL	BDL
Carbamate Pesticides									
	Aldicarb	mg/L	0.003	0.0001	BDL	BDL	BDL	BDL	BDL
	Aldicarb Sulfone	mg/L	0.003	0.0001	BDL	BDL	BDL	BDL	BDL
	Aldicarb Sulfoxide	mg/L	0.004	0.0001	BDL	BDL	BDL	BDL	BDL
	Baygon	mg/L	No Std	0.0001	BDL	BDL	BDL	BDL	BDL
	3-Hydroxycarbofuran	mg/L	No Std	0.0001	BDL	BDL	BDL	BDL	BDL
	Carbaryl	mg/L	No Std	0.0001	BDL	BDL	BDL	BDL	BDL
	Carbofuran	mg/L	0.04	0.0001	BDL	BDL	BDL	BDL	BDL
	Methiocarb	mg/L	No Std	0.0001	BDL	BDL	BDL	BDL	BDL
	Methomyl	mg/L	No Std	0.0001	BDL	BDL	BDL	BDL	BDL
	Oxamyl	mg/L	0.2	0.0001	BDL	BDL	BDL	BDL	BDL
Herbicides Pesticides									
	Aminomethylphosphonic acid (AMPA)	mg/L	No Std	0.005	BDL	BDL	BDL	BDL	BDL
	Bentazon	mg/L	No Std	0.0001	BDL	BDL	BDL	BDL	BDL
	Dalapon	mg/L	0.2	0.0001	BDL	BDL	BDL	BDL	BDL
	2,4-Dichlorophenoxyacetate (2,4-D)	mg/L	0.07	0.00005	BDL	BDL	BDL	BDL	BDL
	Dinoseb	mg/L	0.007	0.0001	BDL	BDL	BDL	BDL	BDL
	Glyphosate	mg/L	0.7	0.005	BDL	BDL	BDL	BDL	BDL
	Pentachlorophenol (PCP)	mg/L	0.001	0.0001	BDL	BDL	BDL	BDL	BDL
	Picloram	mg/L	0.5	0.0001	BDL	BDL	BDL	BDL	BDL
	Silvex	mg/L	0.05	0.00005	BDL	BDL	BDL	BDL	BDL
	TOTAL PESTICIDES	mg/L	0.0005	0.00002	BDL	BDL	BDL	BDL	BDL

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SUBJECT: Water Supply Management Program, Annual Drinking Water Surveillance, Project Number 31-5O-4861-06, USAG Mannheim, Germany, 12-13 July 2006

Table C-7: Total Trihalomethanes in the Distribution System

WATER SUPPLIER				Wasserwerk Kaefertal	Wasserwerk Kaefertal	Wasserwerk Kaefertal	Wasserwerk Kaefertal	Wasserwerk Kaefertal
PWS				Mannheim Area	Mannheim Area	Mannheim Area	Mannheim Area	Mannheim Area
SAMPLE LOCATION				Turley Barracks	Spinnli Barracks	Coleman Barracks	Benjamin Franklin Village	Taylor Barracks
SAMPLE SITE				Bldg 475	Bldg 1563	Bldg 1492	Bldg 2000	Bldg 429
COLLECTION DATE				12-Jul-06	12-Jul-06	12-Jul-06	12-Jul-06	12-Jul-06
PARAMETERS	UNITS	MCL*	MDL ^c	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
Trihalomethanes, total	mg/L	0.08	0.0005	0.012	0.012	0.0012	0.016	0.018
Dibromochloromethane	mg/L	No Std ^b	0.0005	0.0024	0.0016	0.0008	0.002	0.002
Dichlorobromomethane	mg/L	No Std	0.0005	0.0045	0.004	0.0025	0.0056	0.006
Bromoform	mg/L	No Std	0.0005	BDL	BDL	BDL	BDL	BDL
Chloroform	mg/L	No Std	0.0005	0.005	0.0067	0.0089	0.0086	0.0099

Table C-8: Fluoride Results

WATER SUPPLIER				Wasserwerk Kaefertal	Wasserwerk Kaefertal
PWS				Mannheim	Mannheim
SAMPLE LOCATION				Benjamin Franklin Village	Taylor Barracks
SAMPLE SITE				Bldg 2000	Bldg 429
COLLECTION DATE				12-Jul-06	12-Jul-06
PARAMETERS	UNITS	MCL*	MDL ^c	RESULTS	RESULTS
Fluoride	mg/L	4	0.1	1.0	1.0

Table C-9: Field Data

WATER SUPPLIER				Wasserwerk Rheinau	Wasserwerk Kaefertal	Stadtwerke Gruenstadt	U.S. Owned Well
PWS				Friedrichsfeld	Benjamin Franklin Village	Gruenstadt	Dannensfels
SAMPLE LOCATION				Friedrichsfeld	Bldg 700	Gruenstadt AAFES Depot	Donnersberg
SAMPLE SITE				Bldg 1040	Bldg 700	Bldg 3550	Bldg 2451
COLLECTION DATE				12-Jul-06	12-Jul-06	13-Jul-06	13-Jul-06
PARAMETERS	UNITS	MCL*	MDL ^c	RESULTS	RESULTS	RESULTS	RESULTS
Temperature on site	°C	25	0	21.8	15.8	21.5	22.1
pH on site	unitless	6.5 - 9.5	0.01	7.3	7.4	7.7	7.5

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SUBJECT: Water Supply Management Program, Annual Drinking Water Surveillance, Project Number 31-5O-4861-06, USAG Mannheim, Germany, 12-13 July 2006

Table C-10: Friedrichsfeld Area PWS Quarterly Nitrate Monitoring Data

QUARTER DATE			Increased Monitoring Threshold	1 12-Jul-05 RESULTS	2 19-Sep-05 RESULTS	3 17-Jan-06 RESULTS	4 6-Jun-06 RESULTS	Annual Average RESULTS
PARAMETER	UNITS	MCL ^a						
Nitrate	mg/L	10	5	5.81	5.81	5.33	5.72	5.67

Table C-11: Friedrichsfeld Area PWS Quarterly VOC Monitoring Data

QUARTER DATE			Increased Monitoring Threshold	1 12-Jul-05 RESULTS	2 6-Oct-05 RESULTS	3 17-Jan-06 RESULTS	4 6-Jun-06 RESULTS	Annual Average RESULTS
PARAMETER	UNITS	MCL ^a						
Trichloroethylene (TCE)	mg/L	0.005	0.0005	0.0003	0.0002	0.0002	0.0002	0.00023

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APPENDIX D

USACHPPMEUR, DEPARTMENT OF LABORATORY SCIENCES ACCREDITATION/REGISTRATION

1. The Deutscher Akkreditierungs Rat (DAR, German Accreditation Council) recognizes the DIN EN ISO/IEC 17025 accreditation by the Deutsches Akkreditierungssystem Prüfwesen GmbH (DAP) of the Department of Laboratory Sciences (DLS), USACHPPMEUR. The DAP is signatory to the Multilateral Agreement (MLA) of the European cooperation for Accreditation (EA) and to the Mutual Recognition Agreement (MRA) of the International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements of the following countries mutually recognize their accreditations of testing laboratories: Australia, Austria, Belgium, Brazil, Canada, Czech Republic, People's Republic of China, Denmark, Finland, France, Germany, Hong Kong, China, India, Ireland, Italy, Japan, Republic of Korea, The Netherlands, New Zealand, Norway, Portugal, Sweden, Singapore, South Africa, Spain, Switzerland, Chinese Taipei, United Kingdom, U.S.A., and Vietnam. The DLS accreditation is valid until 3 July 2011 and its DAR registration number is DAP-PL-3000.00.
2. The American Industrial Hygiene Association (AIHA) has also accredited the DLS Environmental Lead Testing Program, USACHPPMEUR according to the requirements of ISO/IEC 17025, which is recognized under the EPA Office of Pollution Prevention and Toxics' (OPPT) National Lead Laboratory Accreditation Program (NLLAP) for the matrices of dust, soil, paint chips (residual), and air. The AIHA accreditation of DLS is valid until 1 September 2006.
3. The USACHPPMEUR DLS is registered to ISO 9001:2000 for its Quality Management System and to ISO 14001 for its Environmental Management System by National Quality Assurance, USA. The certificate numbers are 10727 (9001:2000) and EN10037 (14001) and are valid until 6 December 2008 and 25 September 2008, respectively.
4. The German contract laboratory used by USACHPPMEUR DLS, Dr. R. von Nagel, Institut für Analytische Chemie (IAC), Mannheim, Germany is accredited by the DAP to DIN EN ISO/IEC 17025. IAC's DAR registration number is DAP-PA-2792.00, and is valid until 16 February 2010.

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SUBJECT: Water Supply Management Program, Annual Drinking Water Surveillance, Project Number 31-50-4861-06, USAG Mannheim, Germany, 12-13 July 2006

LABORATORY ANALYSIS AND QUALITY CONTROL

1. Sample Analyses. Samples were submitted to the Department of Laboratory Sciences (DLS), United State Army Center for Health Promotion and Preventive Medicine Europe (USACHPPMEUR), for analysis. DLS analyzed the samples for inorganic/physical parameters, heavy metals, polycyclic aromatic hydrocarbons (PAHs), and volatile organic compounds (VOCs). A contract laboratory, the Institut für Analytische Chemie (IAC), Dr. Roland von Nagel, Mannheim, Germany, analyzed the samples for oxidizability. All parameters were analyzed according to U.S. Environmental Protection Agency (USEPA) methods (references 6-8) or German standard methods (DIN) (references 9-12).

a. Color was determined by the American Standard Method 2120 B (reference 13) using the platinum-cobalt (Pt/Co) method. A direct comparison between this method and the method described in the Environmental Final Governing Standards – Germany (GFGS) (DIN 38 404-C1-2) cannot be made due to the different colors measured by each method. The Pt/Co method of measuring color, however, is a standard method for measuring the color of potable water and of water in which color is due to naturally occurring materials. If the color of the sampled water does not exceed the USEPA National Secondary Drinking Water Regulation (NSDWR) guideline of 15 color units for the Pt/Co method (reference 3), it can be assumed that the color will not exceed the MCL of 0.5 m^{-1} using the German DIN spectrophotometric method.

b. Odor was determined by the American Standard Method 2150 B using the threshold odor test at 60°C (reference 13). Standard Method 2150 B states, “For most tap waters and raw water sources, a sample temperature of 60°C will permit the detection of odors that otherwise might be missed; 60°C is the standard temperature for hot threshold odor tests.” The values were compared to the National Secondary Drinking Water Regulation (NSDWR) standard of 3 Threshold Odor Numbers (TON) for odors at 60°C (reference 3).

c. Total Dissolved Solids (TDS) was determined by the American Standard Method 2540 C, dried at 180°C (reference 13). TDS is the non-filterable constituent of the total solids contained in a water sample. The GFGS does not establish an MCL for TDS. However, the USEPA recommends secondary standards to regulate contaminants that may cause aesthetic effects in drinking water. Therefore, the values were compared to the NSDWR secondary standard of 500 mg/L for TDS (reference 3).

d. Turbidity was determined by USEPA Method 180.1 (reference 7) using an electronic nephelometer. Turbidity is an expression of the optical property that causes light to be scattered and absorbed rather than transmitted with no change in direction or flux level throughout the water sample (reference 13). The accuracy, precision, and sensitivity of the nephelometric method make it preferable to visual methods. Turbidity levels were compared with a value of 1 Nephelometric Turbidity Unit (NTU) as a screening criterion.

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2. Quality Control Samples. VOC and pesticide trip blanks were prepared and analyzed during this study. The purpose of the trip blanks is to detect sample contamination originating from sample transport, shipping, and site conditions. The blanks were prepared in advance of the sampling event, transported with the sample containers, and submitted to DLS, USACHPPMEUR, for analysis with the field samples. The blanks consisted of deionized water collected in 40-mL vials and preserved with concentrated hydrochloric acid to a pH of less than two. The vials were sealed without headspace, and transported in the same coolers as the other samples. The laboratory analysis of the trip blank did not reveal any sample contamination (table D-1).

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SUBJECT: Water Supply Management Program, Annual Drinking Water Surveillance, Project Number 31-50-4861-06, USAG Mannheim, Germany, 12-13 July 2006

Table D-1: Trip Blanks

SAMPLE TYPE COLLECTION DATE				Trip Blanks 7/12/2006 to 7/13/2006
PARAMETERS	UNITS	MCL ^a	MDL ^c	RESULTS
Volatile Organic Compounds				
1,2,4 Trichlorobenzene	mg/L	0.07	0.0005	BDL
1,1,2-Trichloroethane	mg/L	0.005	0.0005	BDL
1,1-Dichloroethene	mg/L	0.007	0.0005	BDL
1,2 Dichloroethane	mg/L	0.005	0.0005	BDL
1,2 Dichloropropane	mg/L	0.005	0.0005	BDL
1,2-Dichlorobenzene	mg/L	0.6	0.0005	BDL
1,4-Dichlorobenzene	mg/L	0.075	0.0005	BDL
Benzene	mg/L	0.005	0.0005	BDL
Carbon tetrachloride	mg/L	0.003	0.0005	BDL
Chlorobenzene	mg/L	0.1	0.0005	BDL
Ethylbenzene	mg/L	0.7	0.0005	BDL
Styrene	mg/L	0.1	0.0005	BDL
Toluene	mg/L	1	0.0005	BDL
cis-1,2-Dichloroethene	mg/L	0.07	0.0005	BDL
trans-1,2-Dichloroethene	mg/L	0.1	0.0005	BDL
Vinyl Chloride	mg/L	0.002	0.0005	BDL
Xylenes, total	mg/L	10	0.0005	BDL
1,2 Dibromo-3-chloropropane (DBCP)	mg/L	0.0002	0.00001	BDL
1,2-Dibromoethane (EDB)	mg/L	0.00005	0.00001	BDL
1,1,1 Trichloroethane	mg/L	0.2	0.0005	BDL
Methylene Chloride	mg/L	0.005	0.0005	BDL
Tetrachloroethylene (PCE)	mg/L	0.005	0.0005	BDL
Trichloroethylene (TCE)	mg/L	0.005	0.0005	BDL
2-Methoxy-2-methylpropane (MTBE)	mg/L	No Std ^b	0.0005	BDL
Trihalomethanes, total	mg/L	0.08	0.0005	BDL
Dichlorobromomethane	mg/L	No Std	0.0005	BDL
Dibromochloromethane	mg/L	No Std	0.0005	BDL
Bromoform	mg/L	No Std	0.0005	BDL
Chloroform	mg/L	No Std	0.0005	BDL
Organochlorine Pesticides				
Alachlor	mg/L	No Std	0.00002	BDL
Aldrin	mg/L	No Std	0.00002	BDL
Atrazine	mg/L	No Std	0.0001	BDL
Chlordane	mg/L	No Std	0.0001	BDL
Dieldrin	mg/L	No Std	0.00002	BDL
Endrin	mg/L	No Std	0.00002	BDL
Heptachlor	mg/L	No Std	0.00002	BDL
Heptachlor epoxide	mg/L	No Std	0.00002	BDL
Hexachlorobenzene	mg/L	No Std	0.00002	BDL
Hexachlorocyclopentadiene	mg/L	No Std	0.0001	BDL
Lindane (gamma-HCH)	mg/L	No Std	0.00002	BDL
4,4-Methoxychlor	mg/L	No Std	0.00002	BDL
Simazine	mg/L	No Std	0.0001	BDL